

EXPRESS MAIL LABEL NO.EU854203811US  
Date of Deposit 7/11/03

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re: Application Ser. No. 09/768,372 : Art Unit 2827

Filed 1/23/01 : Exr. J.C.Norris

Inventors Blackshear et al : Atty Dkt No YOR919980001US2

For: STRESS ACCOMMODATION IN ELECTRONIC DEVICE  
INTERCONNECT TECHNOLOGY FOR MILLIMETER CONTACT LOCATIONS

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

BRIEF ON APPEAL

In this Appeal in the above identified application the required 9 items in consecutive order are provided as follows.

Item 1 Real Party in interest.

The entire right title and interest in the above identified application is the property of International Business Machines Corporation of Armonk, N.Y.

Item 2 Related Appeals and Interferences

There are no related appeals and interferences.

Item 3 Status of claims

Claims 1,2,4,7 and 8 and by dependency claims 3,5,6 and 9 - 12 all the elected claims in this application stand finally rejected in a decision dated 2/11/03.

Claims 3,5,6 and 9-12 in the 2/11/03 action are indicated to be allowable if rewritten in independent form.

Claims 13 - 18 are in unelected status pending divisional decision and are not involved in this appeal.

A copy of the appealed claims 1 - 12 is provided in Item 9 The Appendix Section "A" thereof.

**Item 4 Status of amendments**

There is a 4/11/03, After Final Response, that is indicated by stamped return postcard as having been received in the Patent and Trademark office, on which there has been no acknowledgement to date.

**Item 5 Summary of the invention**

In this invention control of the stress due to expansion mismatch is approached using arrays in which each array will have groups of contacts arranged as interfaces, each interface structurally will have two types of portions, one type for the high density electrical contacting and the other type for stress accommodation. Every interface will have at least one of each type portion and the portions are related in that the orientation of the stress accommodation portion is selectable and the contact area of the stress accommodation type portion will be approximately the same as the total contact area of all the high density contacts in the interface.

Considering claim 1 in the light of the specification and drawings. A copy of the 5 sheets of the Drawings are provided in Item 9 Appendix Section B Drawings.

Independent Claim 1

Spec. pages 7-10 Dwgs. Figs 1 - 4

1. In an array of conductive joints between signal pads

on a surface of an integrated circuit member of a material elements 4 & 5

having a first thermal responsiveness and corresponding contacts on an aligned

wiring support member of a material having a second thermal responsiveness,

the improvement comprising:

an interface having first and second portions, elements 1 and 2 Fig 2

said first portion of said interface containing an array of elongated element 1

conductive joint members each having a contacting area elements 10 with area 6

made up of a length contacting dimension and a width contacting

dimension and with said length contacting dimension being longer

than said width dimension , and,

said second portion of said interface having a contacting area Figs 1-4

approximating the contacting area of said conductive joint members pages 7 - 10

of said first portion and so positioned to accommodate expansion

mismatch stresses in said conductive joint members.

Independent claim 7

Specification Dwgs.

7. An improvement in an array of conductive joints between pads Pages 7 - 10 Figs 1 - 4

on a surface of an integrated circuit member of a material having

a first thermal expansion responsiveness and corresponding contacts

on an aligned wiring support member of a material having a second

thermal responsiveness,  
comprising in combination:  
an interface between said pads and said contacts,  
having first and second portions, elements 1 & 2 Figs 2,& 4  
said first portion of said interface containing an array of elongated pages 7 - 10 Figs 2 & 4  
conductive joint members each having a contacting area made up  
of a length contacting dimension and a width contacting dimension  
and with said length contacting dimension being longer  
than said width dimension,  
said array of conductive joint members each being oriented with  
said length contacting length dimension in a common direction, and, Figs 2, 4  
said second portion of said interface having a contacting area Pages 7 -10  
approximating the contacting area of said conductive joint members  
of said first portion and so positioned to accommodate expansion  
mismatch stresses in said conductive joint members.

#### Item 6 The Issues

In the 2/11/03 Final rejection all claims stand rejected as anticipated by the Dordi reference.

There is an issue on whether the rejection includes all the limitations in the invention.

There is an issue on whether a prime facie case of anticipation is made out by the support advanced in connection with the rejection and there is an issue on whether sufficient facts exist in the Dordi reference to support the anticipation assertion.

## Item 7 Grouping of claims

The claims do not stand or fall together

The independent claims 1 and 7 each is considered to be a separate patentable way of expressing the invention.

Each of the dependent claims 2 - 6, and 8 - 12 is considered as being independently patentable through the providing of an additional limitation to a believed to be patentable claim.

## Item 8 Argument

It is appellants' position that critical claim limitation elements of appellants' invention are not being recognized and given their full weight. Specifically, it is submitted that in the Dordi reference and in any of the art of record singly or in combination the concept of interfaces and the relationship of contact areas in the interface portions is not present yet this concept is a distinguishing feature over the Dordi reference and the art.

This invention teaches control of stress due to expansion mismatch in a different way than has been seen heretofore in the art, in this invention the array will have groups of contacts arranged as interfaces, each interface structurally will have two types of portions, one type for the high density electrical contacting and the other type for stress accommodation. Every interface will have at least one of each type portion and the portions are related in that the orientation of the stress accommodation portion is selectable and the contact area of the stress accommodation type portion will be approximately the same as the total contact area of all the high density contacts in the interface.

It is appellants' position that the two portion type interface (elements 1 & 2 in Fig.2) is not present and has not been taken into consideration in the rejection. It is well settled that every limitation must be given effect as described in *In Re. Geerdes "A"* in citation table in Item 9 Section "C".

For perspective, in the invention each interface structurally will have two types of portions having elongated shapes, one type for the electrical conduction purposes and the other type for the stress accommodation purposes. Every interface of the invention will have at least one of each type portion. A variety of structural arrangements may be employed. In the embodiment illustrated in Fig. 2 the electrical type portion 1 is made up of a plurality of electrical contact elements 1 and the stress accommodation type portion 2 is a single, orientable element related to the first portion type by having the contact area of the second type portion 2 be approximately the same as the total contact area of all the elements 1 in the first type portion. The orientation is in the vicinity of being orthogonal with the orientation of the element 2 being arrangeable to accommodate stresses of various magnitudes.

Considering next the 35 USC 102 rejection which requires that each limitation of the claim be met and all limitations be met in the same way. It is submitted that the limitations to the interface portions are not spoken to in the support of the rejection assertion with respect to the Dordi reference so that the requirements for the issue of the advancement of a prime facie case have not been met. It is further submitted that the factual content of the Dordi reference does not supply the required teaching of the interface portions needed for anticipation.

It is appellants' position that the references do not support the teaching they are assumed to have. It is urged that the Dordi 5,859,474 reference is generally directed to advantages in conductor arrangement where elongated contacts are used. The Dordi reference is referred to on page 2 of applicants specification. It is further urged that the Cornell 6,184,581 reference may be considered as being generally directed to control of solder quantities, the Yoneda 6,229,711 reference may be considered as being generally directed to a wiring width related to bump pattern and the cited but not applied Pai 6,493,238 reference may be considered as being generally directed to the use of mechanically compliant members. It is appellants' position that a full and reasoned explanation record as would be expected in accordance with the Dickenson v Zurko 50USPQ 2d 1930 "B" and InRe Sang-Su Lee CAFC 00-1158 Jan. 18, 2002 "C" decisions just is not present.

In view of the above the final rejection should be reversed and appellants' claims be considered as clearly distinguishing and patentable.

Respectfully submitted,

  
Alvin J. Riddles  
Reg. No. 17862

1 1. In an array of conductive joints between signal pads on a surface of an integrated circuit

2 member of a material having a first thermal responsiveness and corresponding

3 contacts on an aligned wiring support member of a material having a second thermal

4 responsiveness,

5 the improvement comprising:

6 an interface having first and second portions,

7 said first portion of said interface containing an array of elongated conductive joint

8 members each having a contacting area made up of a length contacting dimension and

9 a width contacting dimension and with said length contacting dimension being longer

10 than said width dimension , and,

11 said second portion of said interface having a contacting area approximating the contacting

12 area of said conductive joint members of said first portion and operable so positioned to

13 accommodate expansion mismatch stresses in said conductive joint members.

1 2. The improvement of claim 1 wherein said second portion of said interface is at least one

2 contacting area positioned orthogonally with respect to said aligned direction.

1 3. The improvement of claim 1 wherein said second portion of said interface is an elongated

2 contact in contact with said surface and a circular contact in contact with said wiring support

3 member for each member of said array.

1 4. The improvement of claim 1 wherein said second portion of said interface is a contacting

2 area taken from the group of:

3 contact areas to the surface to which said conductive joints are attached,  
4 alternate conductive joint members attached to said wiring support member, and,  
5 elongated and circular contacts at opposite ends of each conductive joint with said  
6 elongated contact at said surface and said circular contact in contact with said  
7 wiring support.

1 5. The improvement of claim 1 wherein said second portion of said interface is an elongated  
2 contact in contact with said surface having major and minor essentially perpendicular axes  
3 and a circular contact having a radius in contact with said wiring support member for each  
4 member of said array.

1 6. The improvement of claim 5 wherein the bending stress resistant value of said second  
2 portion of said interface is a ratio of said radius value over said minor axis value.

1 7. An improvement in an array of conductive joints between pads on a surface of an  
2 integrated circuit member of a material having a first thermal expansion responsiveness and  
3 corresponding contacts on an aligned wiring support member of a material having a second  
4 thermal responsiveness,  
5 comprising in combination:  
6 an interface between said pads and said contacts, having first and second portions,  
7 said first portion of said interface containing an array of elongated conductive joint  
8 members each having a contacting area made up of a length contacting dimension and  
9 a width contacting dimension and with said length contacting dimension being longer

10 than said width dimension,  
11 said array of conductive joint members each being oriented with said length contacting  
12 length dimension in a common direction, and,  
13 said second portion of said interface having a contacting area approximating the contacting  
14 area of said conductive joint members of said first portion and so positioned  
15 to accommodate expansion mismatch stresses in said  
16 conductive joint members.

1 8. The improvement of claim 7 wherein said second portion of said interface is at least one  
2 contacting area positioned orthogonally with respect to said common direction.

1 9. The improvement of claim 7 wherein said second portion of said interface is an elongated  
2 contact in contact with said surface and a circular contact in contact with said wiring support  
3 member for each member of said array.

1 10. The improvement of claim 9 wherein said second portion of said interface is a contacting  
2 area taken from the group of:  
3 contact areas to the surface to which said conductive joints are attached,  
4 alternate conductive joint members attached to said wiring support member; and,  
5 elongated and circular contacts at opposite ends of each conductive joint with said  
6 elongated contact at said surface and said circular contact in contact with said  
7 wiring support.

1        11. The improvement of claim 10 wherein said second portion of said interface is an  
2        elongated contact in contact with said surface having major asnd minor essentially  
3        perpendicular axes and a circular contact having a radius in contact with said wiring  
4        support member for each member of said array.

1        12. The improvement of claim 11 wherein the bending stress resistant value of said second  
2        portion of said interface is a ratio of said radius value over said minor axis value.

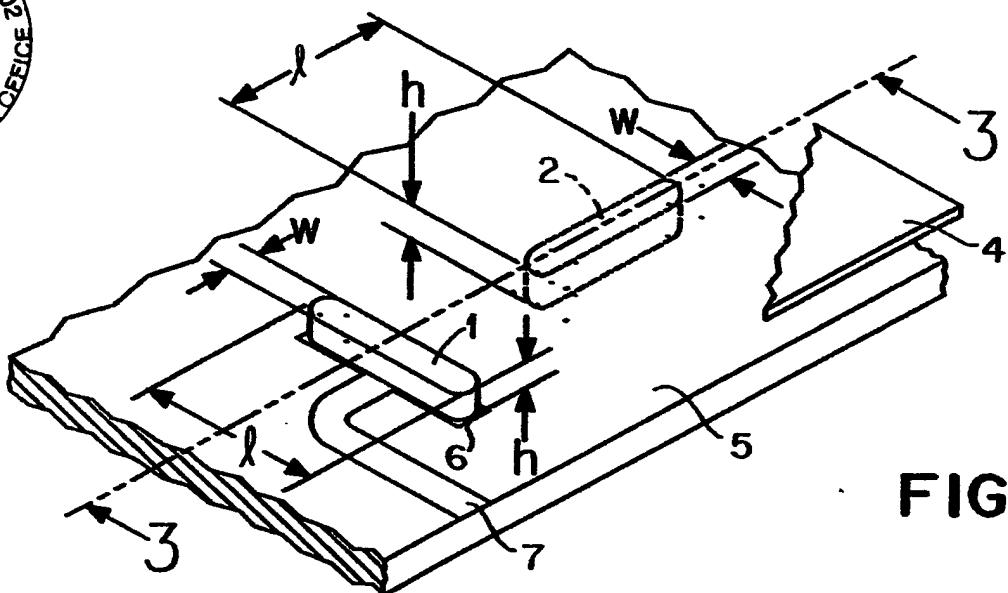


FIG. 1

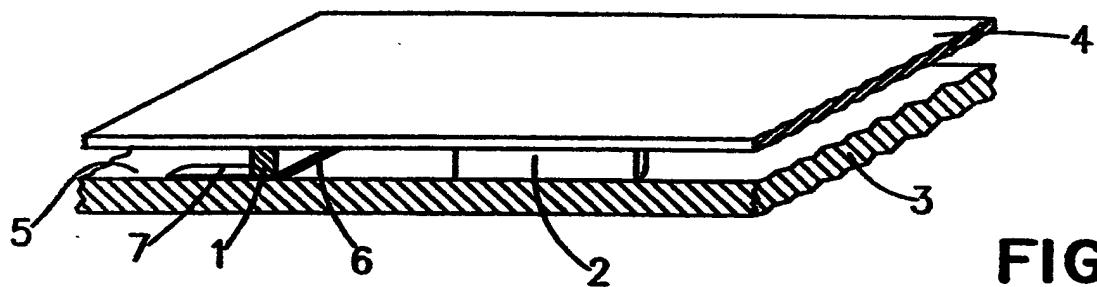
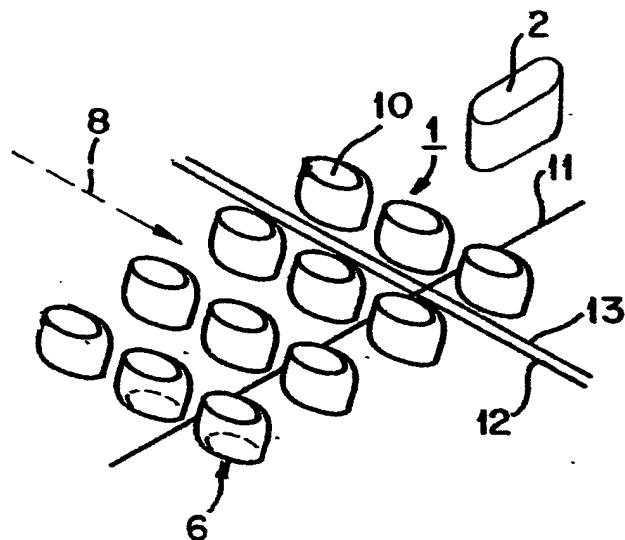


FIG. 3

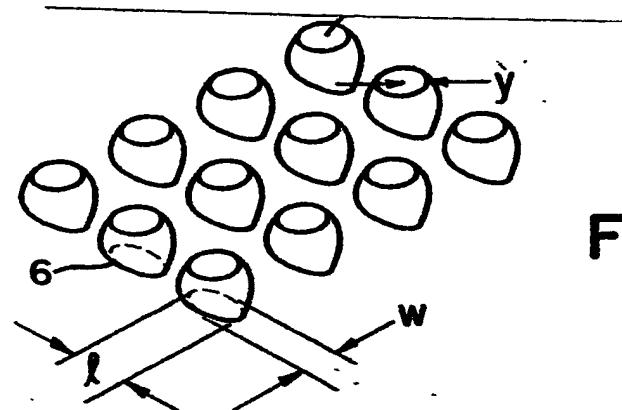


FIG. 4

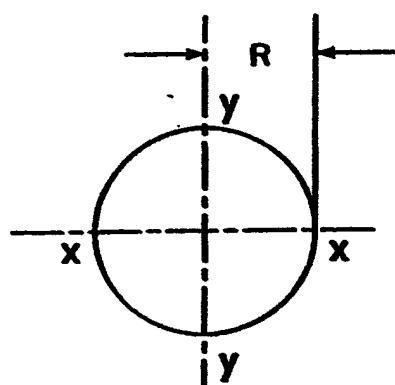
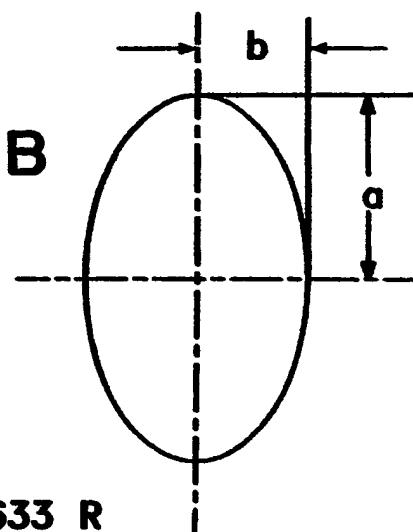
CIRCLEELLIPSE

FIG. 5 B

AREA MOMENT OF INERTIA:

$$i_{xx} = .785 R^4 (\pi R^4 / 4)$$

$$i_{yy} = .785 R^4 (\pi R^4 / 4)$$

FIG. 5 A

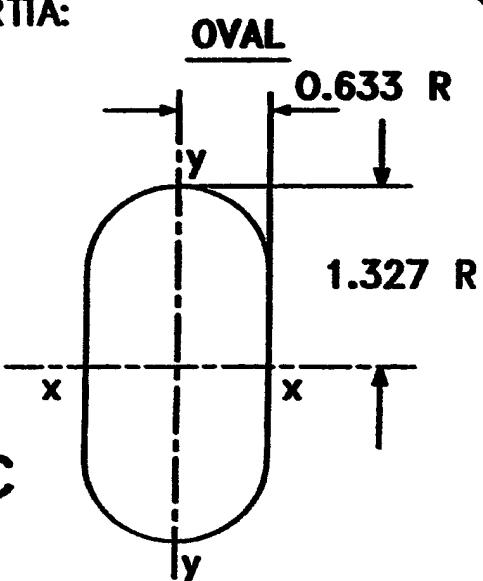


FIG. 5 C

$$i_{xx} = 1.534 R^4$$

$$i_{yy} = .410 R^4$$



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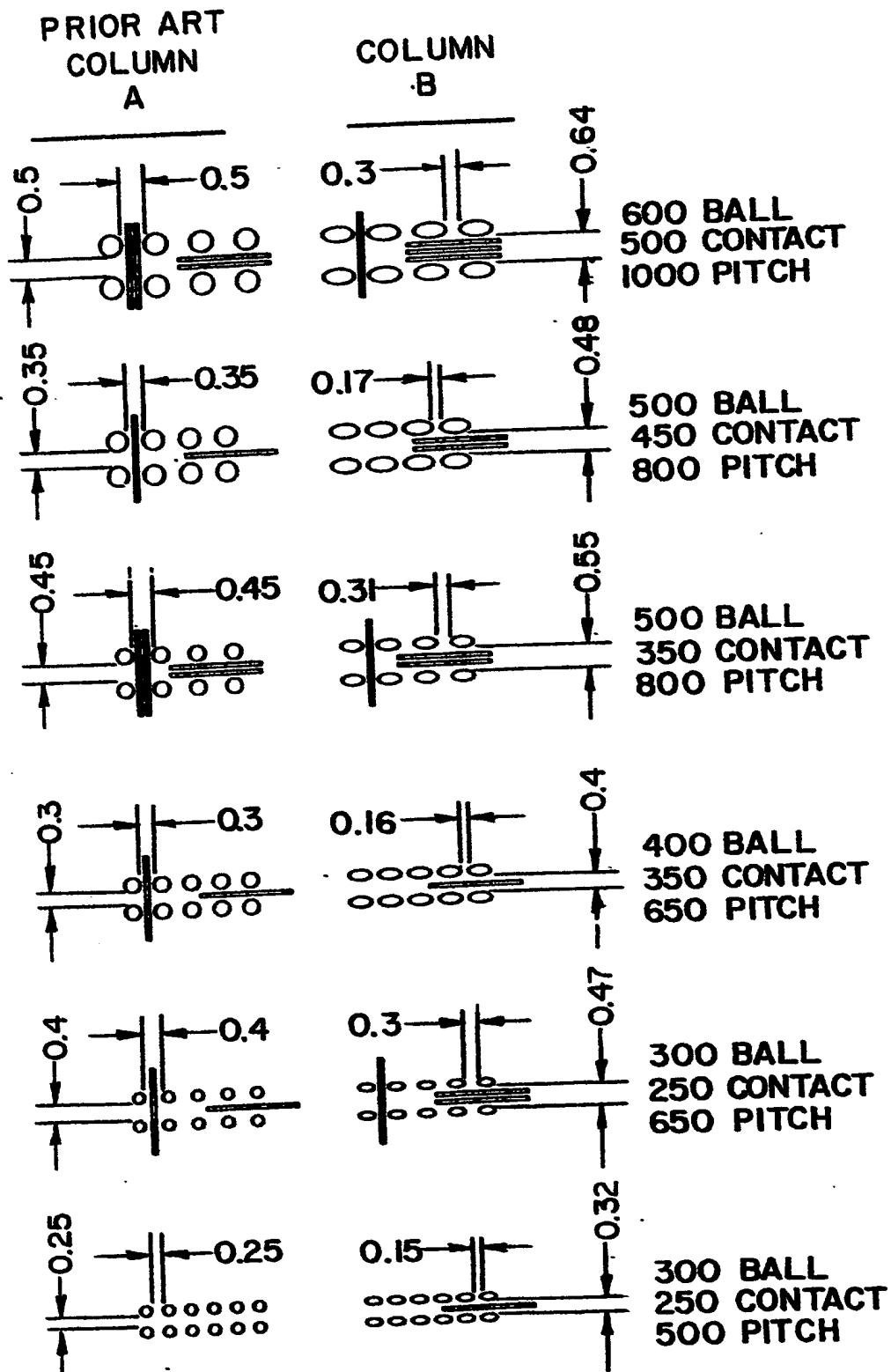


FIG.  
6A

FIG.  
6B

FIG.  
6C

FIG.  
6D

FIG.  
6E

FIG.  
6F

FIG. 7  
PRIOR ART

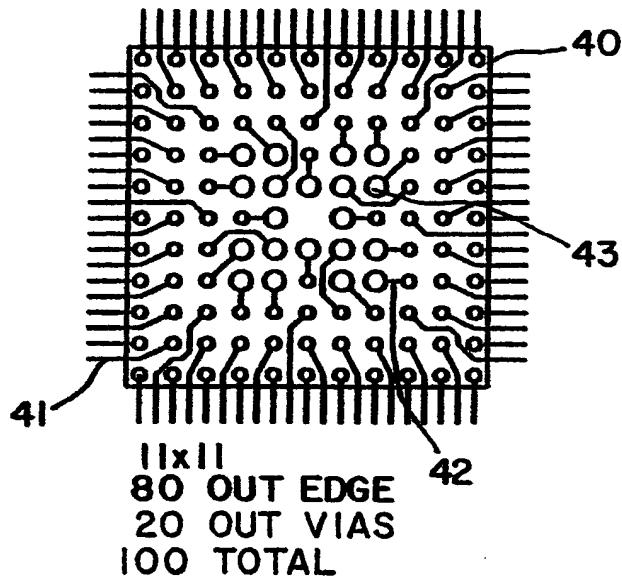


FIG. 8

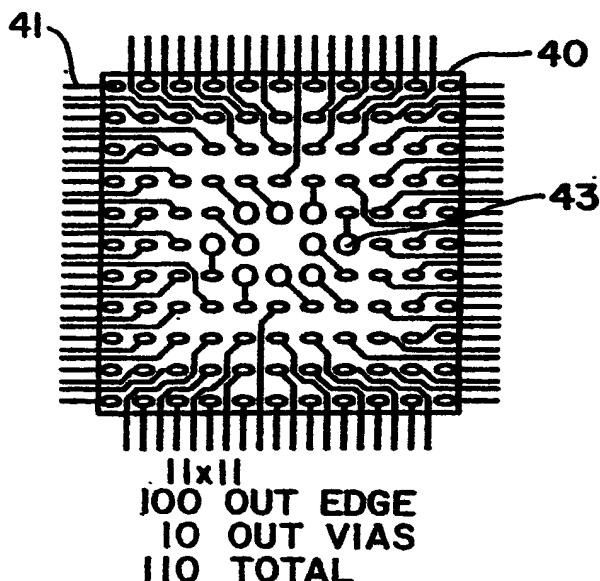
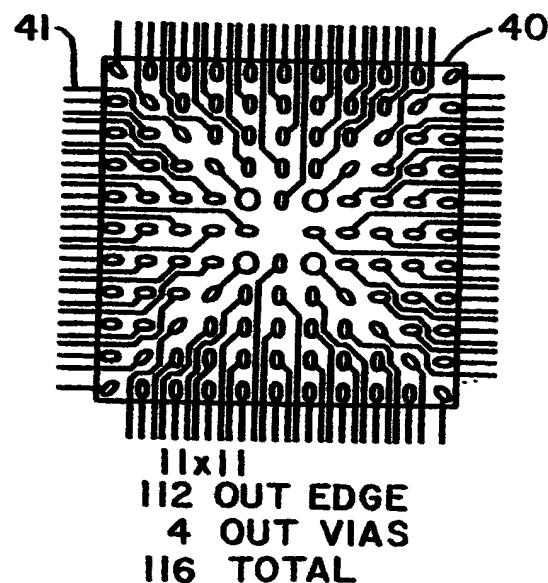


FIG. 9

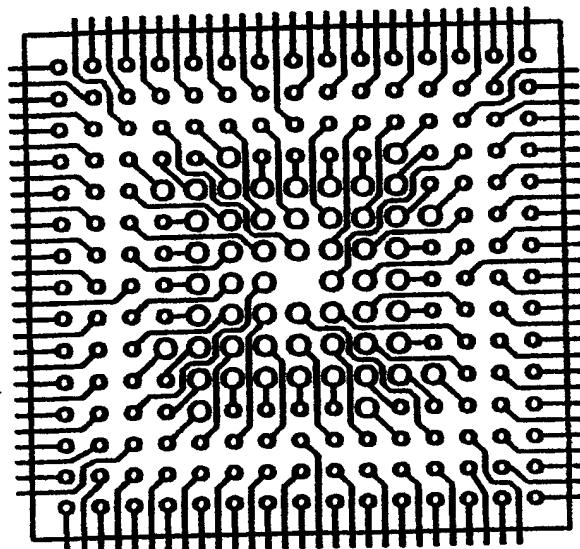




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**FIG. 10**  
PRIOR ART

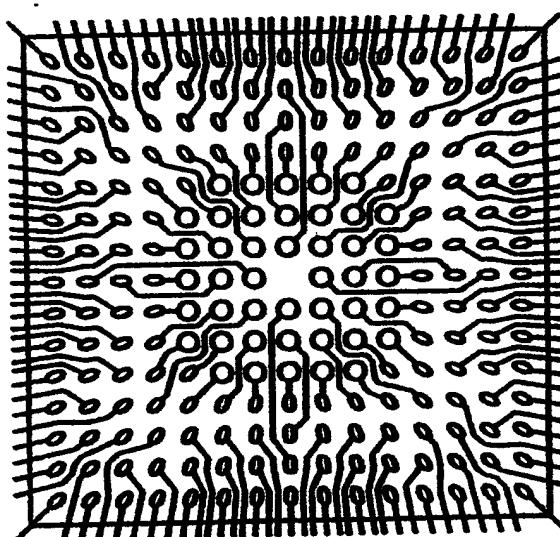
15 x 15



112 OUT EDGE  
56 OUT VIAS  
168 TOTAL

**FIG. 11**

15 x 15



50

136 OUT EDGE  
44 OUT VIAS  
176 TOTAL

5

Item 9 Appendix Section "C" Citation Table



TABLE OF DECISION CITATIONS

- "A" In Re Geerdes 180 USPQ 789
- "B" Dickinson v Zurko 50 USPQ2d 1930
- "C" In Re Sang-Su Lee CAFC 00-1158 1/18/02



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**Item 5              Summary of the invention**

In this invention control of the stress due to expansion mismatch is approached using arrays in which each array will have groups of contacts arranged as interfaces, each interface structurally will have two types of portions, one type for the high density electrical contacting and the other type for stress accommodation. Every interface will have at least one of each type portion and the portions are related in that the orientation of the stress accommodation portion is selectable and the contact area of the stress accommodation type portion will be approximately the same as the total contact area of all the high density contacts in the interface.

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Independent Claim 1

Spec.

pages 7-10

Dwgs.

Figs 1 - 4

1. In an array of conductive joints between signal pads  
on a surface of an integrated circuit member of a material

elements 4 & 5

having a first thermal responsiveness and corresponding contacts on an aligned  
wiring support member of a material having a second thermal responsiveness,  
the improvement comprising:

an interface having first and second portions, elements 1 and 2 Fig 2

said first portion of said interface containing an array of elongated element 1

conductive joint members each having a contacting area elements 10 with area 6

made up of a length contacting dimension and a width contacting

dimension and with said length contacting dimension being longer

than said width dimension , and,

said second portion of said interface having a contacting area Figs 1-4

approximating the contacting area of said conductive joint members pages 7 - 10

of said first portion and so positioned to accommodate expansion

mismatch stresses in said conductive joint members.

Independent claim 7

Specification Dwgs.

7. An improvement in an array of conductive joints between pads Pages 7 - 10 Figs 1 - 4  
on a surface of an integrated circuit member of a material having  
a first thermal expansion responsiveness and corresponding contacts  
on an aligned wiring support member of a material having a second

thermal responsiveness,  
comprising in combination:  
an interface between said pads and said contacts,  
having first and second portions, elements 1 & 2 Figs 2,& 4  
said first portion of said interface containing an array of elongated pages 7 - 10 Figs 2 & 4  
conductive joint members each having a contacting area made up  
of a length contacting dimension and a width contacting dimension  
and with said length contacting dimension being longer  
than said width dimension,  
said array of conductive joint members each being oriented with  
said length contacting length dimension in a common direction, and, Figs 2, 4  
said second portion of said interface having a contacting area Pages 7 -10  
approximating the contacting area of said conductive joint members  
of said first portion and so positioned to accommodate expansion  
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## Item 6 The Issues

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This invention teaches control of stress due to expansion mismatch in a different way than has been seen heretofore in the art, in this invention the array will have groups of contacts arranged as interfaces, each interface structurally will have two types of portions, one type for the high density electrical contacting and the other type for stress accomodation. Every interface will have at least one of each type portion and the portions are related in that the orientation of the stress accommodation portion is selectable and the contact area of the stress accommodation type portion will be approximately the same as the total contact area of all the high density contacts in the interface.

It is appellants' position that the two portion type interface (elements 1 & 2 in Fig. 2) is not present and has not been taken into consideration in the rejection. It is well settled that every limitation must be given effect as described in *In Re. Geerde "A"* in citation table in Item 9 Section "C".

For perspective, in the invention each interface structurally will have two types of portions having elongated shapes, one type for the electrical conduction purposes and the other type for the stress accommodation purposes. Every interface of the invention will have at least one of each type portion. A variety of structural arrangements may be employed. In the embodiment illustrated in Fig. 2 the electrical type portion 1 is made up of a plurality of electrical contact elements 1 and the stress accommodation type portion 2 is a single, orientable element related to the first portion type by having the contact area of the second type portion 2 be approximately the same as the total contact area of all the elements 1 in the first type portion. The orientation is in the vicinity of being orthogonal with the orientation of the element 2 being arrangeable to accommodate stresses of various magnitudes.

Considering next the 35 USC 102 rejection which requires that each limitation of the claim be met and all limitations be met in the same way. It is submitted that the limitations to the interface portions are not spoken to in the support of the rejection assertion with respect to the Dordi reference so that the requirements for the issue of the advancement of a prime facie case have not been met. It is further submitted that the factual content of the Dordi reference does not supply the required teaching of the interface portions needed for anticipation.

It is appellants' position that the references do not support the teaching they are assumed to have. It is urged that the Dordi 5,859,474 reference is generally directed to advantages in conductor arrangement where elongated contacts are used. The Dordi reference is referred to on page 2 of applicants specification. It is further urged that the Cornell 6,184,581 reference may be considered as being generally directed to control of solder quantities, the Yoneda 6,229,711 reference may be considered as being generally directed to a wiring width related to bump pattern and the cited but not applied Pai 6,493,238 reference may be considered as being generally directed to the use of mechanically compliant members. It is appellants' position that a full and reasoned explanation record as would be expected in accordance with the Dickenson v Zurko 50USPQ 2d 1930 "B" and InRe Sang-Su Lee CAFC 00-1158 Jan.18,2002 "C" decisions just is not present.

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Respectfully submitted,

  
Alvin J. Riddles  
Reg. No. 17862

1 1. In an array of conductive joints between signal pads on a surface of an integrated circuit

2 member of a material having a first thermal responsiveness and corresponding

3 contacts on an aligned wiring support member of a material having a second thermal

4 responsiveness,

5 the improvement comprising:

6 an interface having first and second portions,

7 said first portion of said interface containing an array of elongated conductive joint

8 members each having a contacting area made up of a length contacting dimension and

9 a width contacting dimension and with said length contacting dimension being longer

10 than said width dimension , and,

11 said second portion of said interface having a contacting area approximating the contacting

12 area of said conductive joint members of said first portion and operable so positioned to

13 accommodate expansion mismatch stresses in said conductive joint members.

1 2. The improvement of claim 1 wherein said second portion of said interface is at least one

2 contacting area positioned orthogonally with respect to said aligned direction.

1 3. The improvement of claim 1 wherein said second portion of said interface is an elongated

2 contact in contact with said surface and a circular contact in contact with said wiring support

3 member for each member of said array.

1 4. The improvement of claim 1 wherein said second portion of said interface is a contacting

2 area taken from the group of:

3 contact areas to the surface to which said conductive joints are attached,  
4 alternate conductive joint members attached to said wiring support member, and  
5 elongated and circular contacts at opposite ends of each conductive joint with said  
6 elongated contact at said surface and said circular contact in contact with said  
7 wiring support.

1 5. The improvement of claim 1 wherein said second portion of said interface is an elongated  
2 contact in contact with said surface having major and minor essentially perpendicular axes  
3 and a circular contact having a radius in contact with said wiring support member for each  
4 member of said array.

1 6. The improvement of claim 5 wherein the bending stress resistant value of said second  
2 portion of said interface is a ratio of said radius value over said minor axis value.

1 7. An improvement in an array of conductive joints between pads on a surface of an  
2 integrated circuit member of a material having a first thermal expansion responsiveness and  
3 corresponding contacts on an aligned wiring support member of a material having a second  
4 thermal responsiveness,

5 comprising in combination:  
6 an interface between said pads and said contacts, having first and second portions,  
7 said first portion of said interface containing an array of elongated conductive joint  
8 members each having a contacting area made up of a length contacting dimension and  
9 a width contacting dimension and with said length contacting dimension being longer

10 than said width dimension,  
11 said array of conductive joint members each being oriented with said length contacting  
12 length dimension in a common direction, and,  
13 said second portion of said interface having a contacting area approximating the contacting  
14 area of said conductive joint members of said first portion and so positioned  
15 to accommodate expansion mismatch stresses in said  
16 conductive joint members.

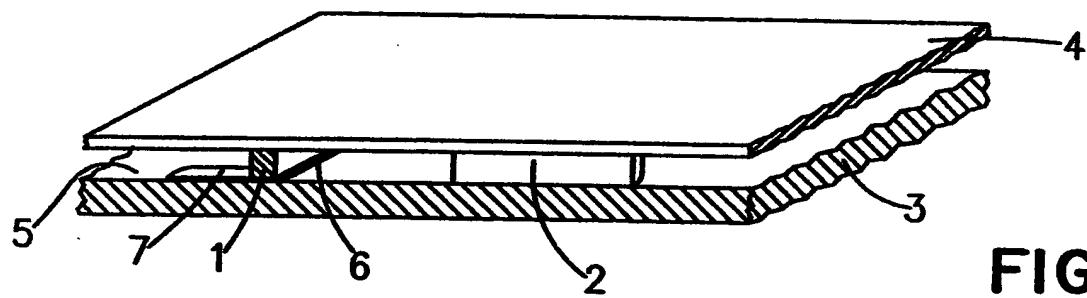
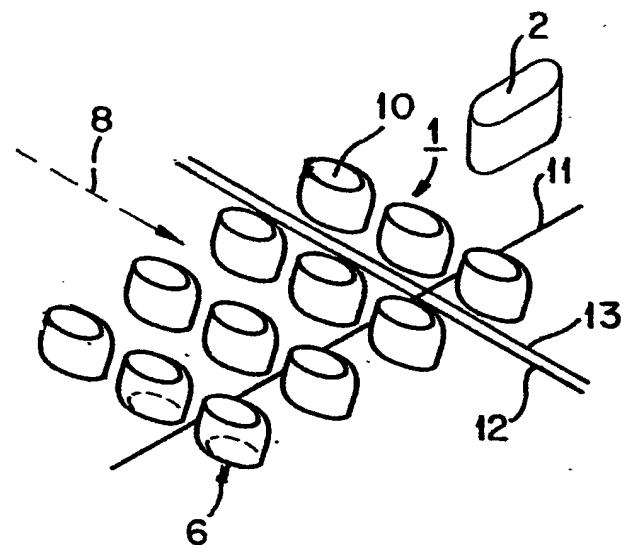
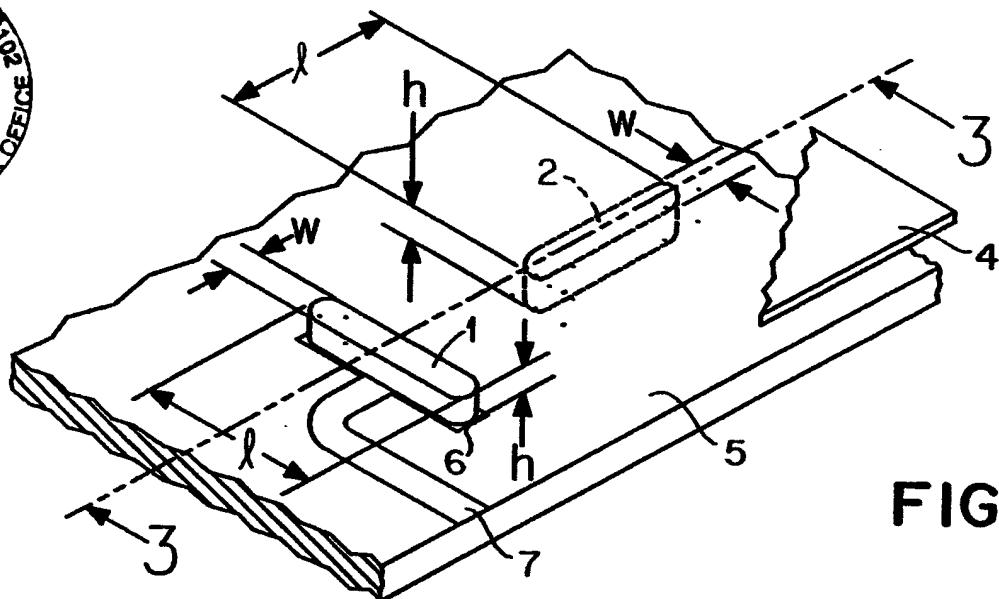
1 8. The improvement of claim 7 wherein said second portion of said interface is at least one  
2 contacting area positioned orthogonally with respect to said common direction.

1 9. The improvement of claim 7 wherein said second portion of said interface is an elongated  
2 contact in contact with said surface and a circular contact in contact with said wiring support  
3 member for each member of said array.

1 10. The improvement of claim 9 wherein said second portion of said interface is a contacting  
2 area taken from the group of:  
3 contact areas to the surface to which said conductive joints are attached,  
4 alternate conductive joint members attached to said wiring support member; and,  
5 elongated and circular contacts at opposite ends of each conductive joint with said  
6 elongated contact at said surface and said circular contact in contact with said  
7 wiring support.

1        11. The improvement of claim 10 wherein said second portion of said interface is an  
2        elongated contact in contact with said surface having major asnd minor essentially  
3        perpendicular axes and a circular contact having a radius in contact with said wiring  
4        support member for each member of said array.

1        12. The improvement of claim 11 wherein the bending stress resistant value of said second  
2        portion of said interface is a ratio of said radius value over said minor axis value.





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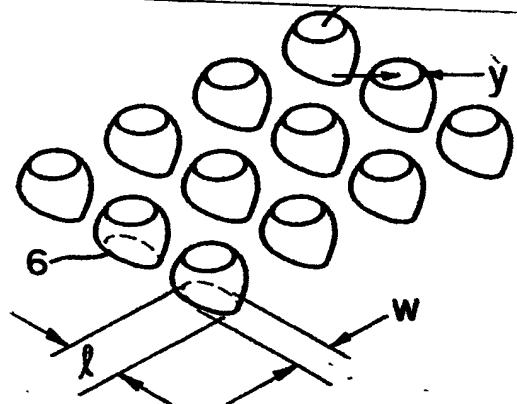
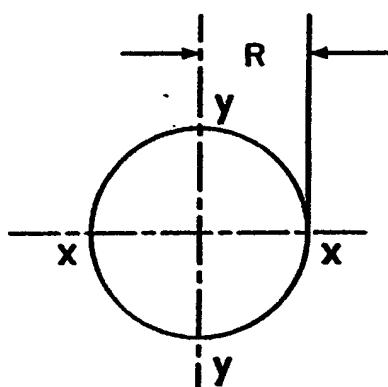


FIG. 4

CIRCLE



ELLIPSE

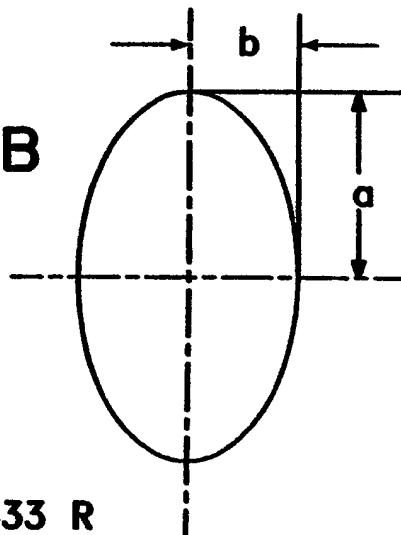


FIG. 5 B

AREA MOMENT OF INERTIA:

$$i_{xx} = .785 R^4 (\pi R^4 / 4)$$

$$i_{yy} = .785 R^4 (\pi R^4 / 4)$$

FIG. 5 A

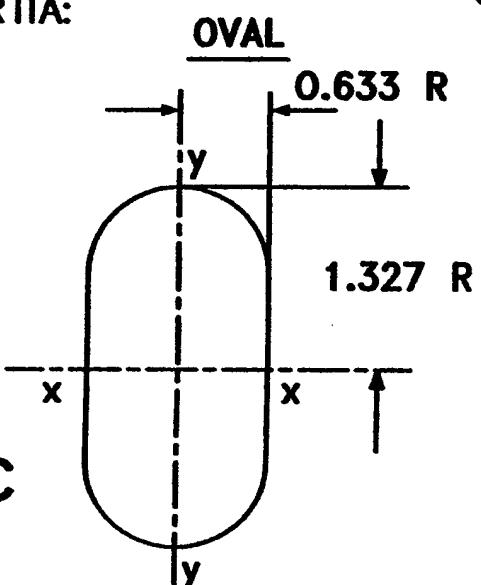


FIG. 5 C

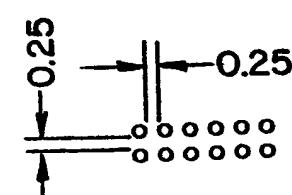
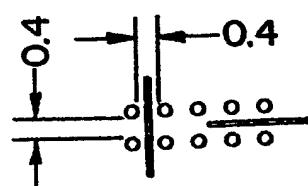
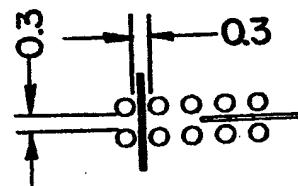
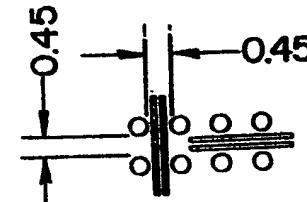
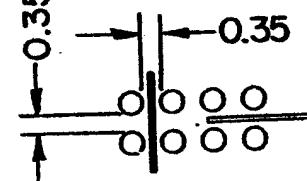
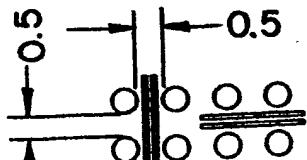
$$i_{xx} = 1.534 R^4$$

$$i_{yy} = .410 R^4$$

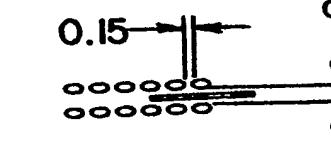
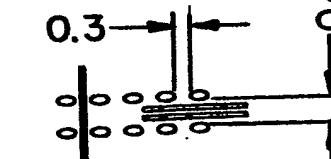
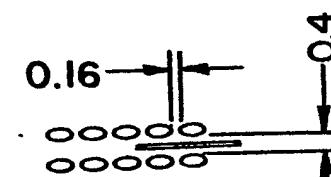
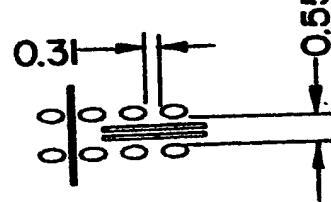
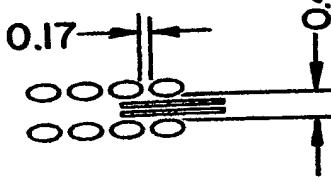
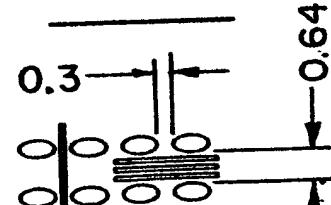


3025

PRIOR ART  
COLUMN  
A



COLUMN  
B



600 BALL  
500 CONTACT  
1000 PITCH

500 BALL  
450 CONTACT  
800 PITCH

500 BALL  
350 CONTACT  
800 PITCH

400 BALL  
350 CONTACT  
650 PITCH

300 BALL  
250 CONTACT  
650 PITCH

300 BALL  
250 CONTACT  
500 PITCH

FIG.  
6A

FIG.  
6B

FIG.  
6C

FIG.  
6D

FIG.  
6E

FIG.  
6F



40E5

FIG. 7  
PRIOR ART

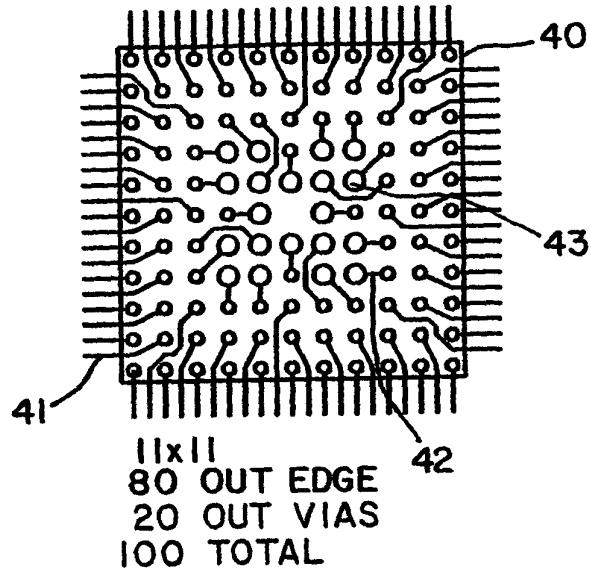


FIG. 8

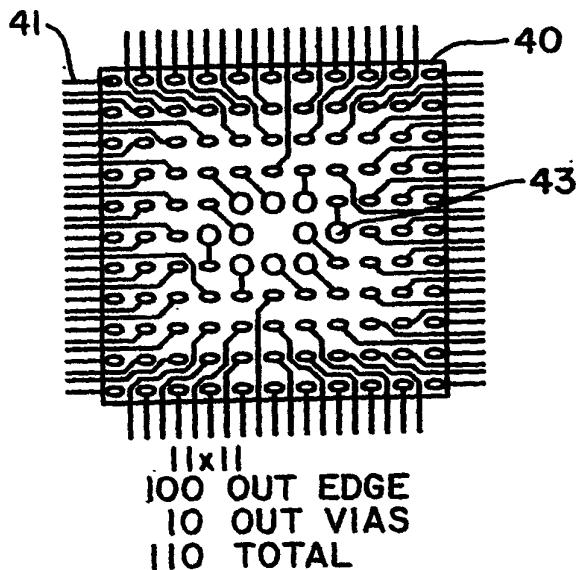
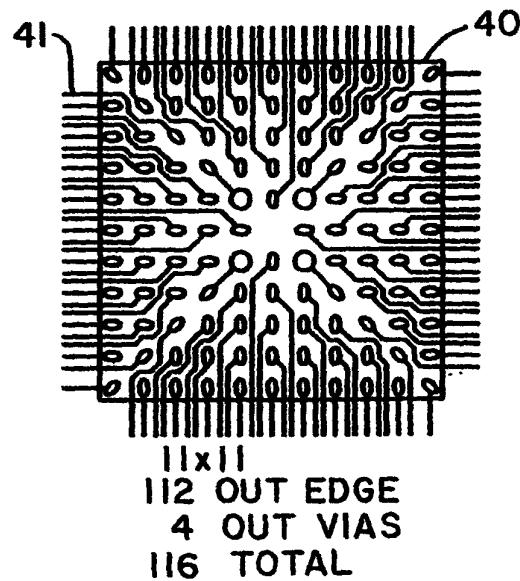


FIG. 9

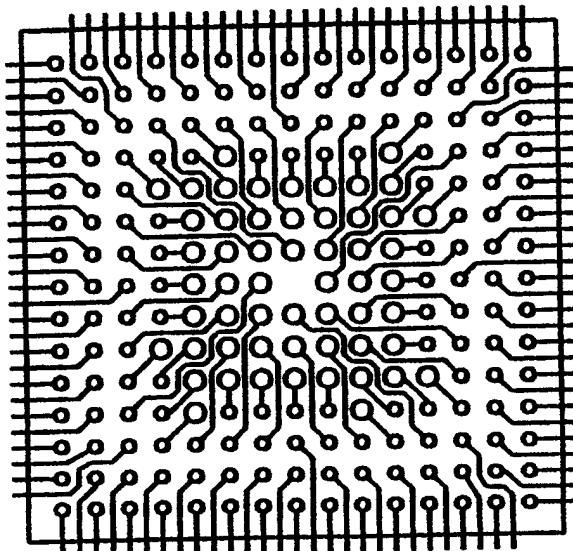




5055

**FIG. 10**  
PRIOR ART

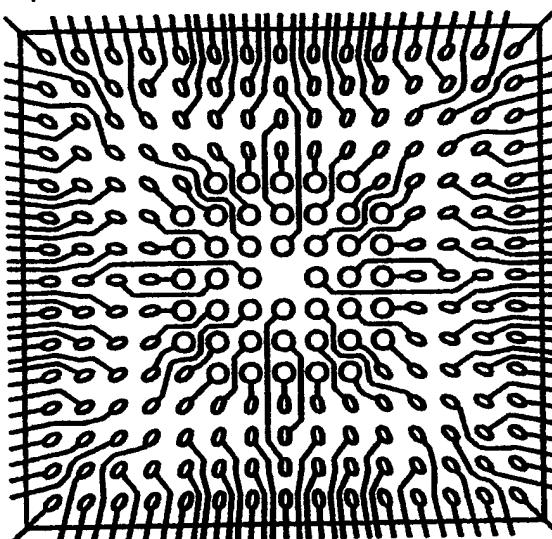
15 x 15



112 OUT EDGE  
56 OUT VIAS  
168 TOTAL

**FIG. 11**

15 x 15



136 OUT EDGE  
44 OUT VIAS  
176 TOTAL

5

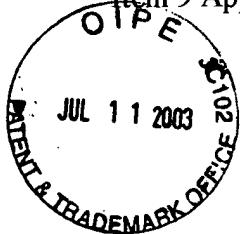


TABLE OF DECISION CITATIONS

"A" In Re Geerdes 180 USPQ 789

"B" Dickinson v Zurko 50 USPQ2d 1930

"C" In Re Sang-Su Lee CAFC 00-1158 1/18/02